

IN THE CLAIMS

Please amend the claims as follows:

Claim 1 (Original): Method for removal of metal cations contained in a liquid in which said liquid is brought into contact at a temperature higher than or equal to 60°C, with a chelating ion exchange resin formed from polyazacycloalkane grafted on a solid support, said resin having been conditioned, previously to said contacting, at a pH of 4 to 6.

Claim 2 (Original): Method according to Claim 1 in which the contacting is carried out at a temperature of 60 to 80°C.

Claim 3 (Original): Method according to Claim 1 in which the conditioning pH is 4 to 5.

Claim 4 (Currently Amended): Method according to Claim 1 in which the conditioning of said resin is carried out by contacting said resin with a buffer solution, ~~especially aqueous~~, in which the pH is 4 to 6, possibly, wherein the conditioning may be preceded and/or followed or both preceded and followed, by a rinsing of the resin with a major solvent of the liquid to be treated, ~~especially with distilled water~~.

Claim 5 (Original): Method according to Claim 1 carried out continuously, said resin being placed in at least one column passed through by a current of liquid to be treated.

Claim 6 (Original): Method according to Claim 1 comprising, in addition, a regeneration step of said resin, when the latter is saturated by the fixed metals.

Claim 7 (Previously Presented): Method according to Claim 5 in which said regeneration is carried out by passing a regeneration solution through the column(s) in the reverse direction from the direction of circulation of the liquid to be treated.

Claim 8 (Currently Amended): Method according to Claim 7 in which said regeneration solution is ~~chosen from the~~ one or more acid solutions, ~~for example, nitric acid.~~

Claim 9 (Previously Presented): Method according to Claim 7 in which at the end of the regeneration step, said regeneration solution containing the metals initially fixed on the resin is treated to recover the metals.

Claim 10 (Previously Presented): Method according to Claim 1 comprising a prior step for treatment of the liquid by contacting with an ion exchanger or organic or mineral adsorbent different from said polyazacycloalkane resin grafted on a support.

Claim 11 (Currently Amended): Method according to Claim 10 in which said adsorbent is ~~chosen from the~~ one or more silica gels.

Claim 12 (Currently Amended): Method according to Claim 10 in which said ion exchanger is ~~chosen from resins of the~~ a polyacrylate type, resins of the AMBERLITE® type resin.

Claim 13 (Original): Method according to Claim 10 in which said prior treatment step is carried out continuously, said ion exchanger or adsorbent being placed in at least one

column passed through by a current of liquid to be treated and positioned upstream of said column filled with resin.

Claim 14 (Original): Method according to Claim 11 in which said ion exchanger or adsorbent is regenerated when it is saturated by the fixed metals under the same conditions as the resin and at the same time as regeneration of the latter and with the same regeneration solution.

Claim 15 (Currently Amended): Method according to Claim 1 in which said metal cations to be removed are one or more metal cations ~~chosen from~~ selected from the group consisting of transition metals, heavy metals, metals from group IIIA of the periodic table, lanthanides, actinides and alkaline-earth metals.

Claim 16 (Currently Amended): Method according to Claim 13 in which said metal cations are ~~chosen among the~~ one or more cations ~~of~~ selected from the group consisting of cations of U, Pu, Am, Ce, Eu, Al, Gd, Cr, Mn, Fe, Co, Ni, Cu, Zn, Ag, Cd, B, Au, Hg, Pb, As, Ca, Sr, Mg, Be, Ba and Ra.

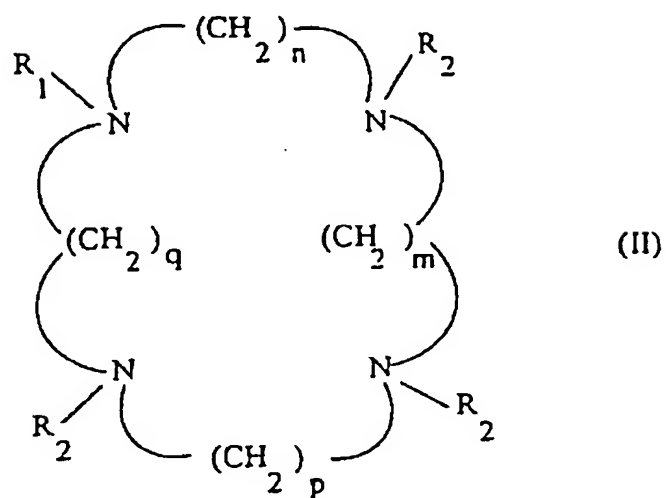
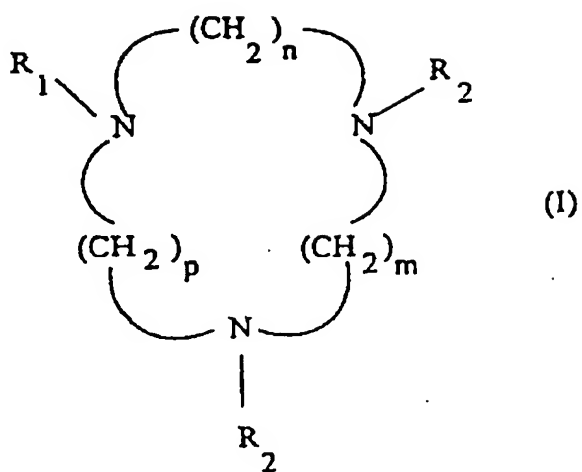
Claim 17 (Previously Presented): Method according to Claim 1 in which the treated liquid is an aqueous liquid.

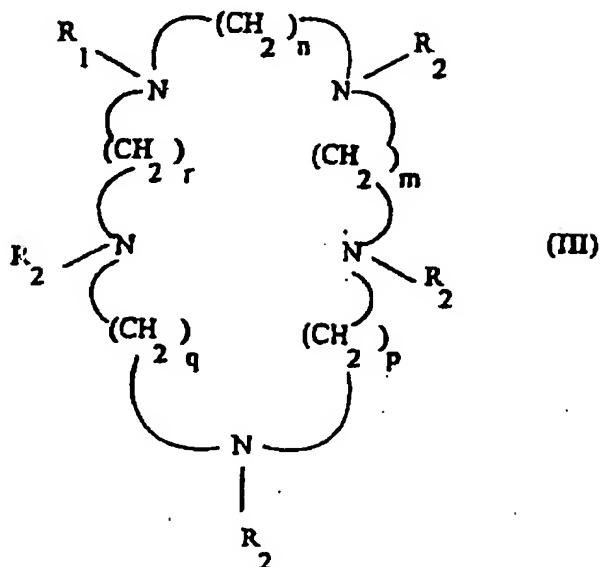
Claim 18 (Previously Presented): Method according to Claim 1 in which the treated liquid is a radioactive aqueous effluent with low activity.

Claim 19 (Currently Amended): Method according to Claim ~~[[19]]~~ 18 in which said effluent is the aqueous effluent with low activity originating from the industrial evaporator of the treatment installation of effluents from a nuclear installation.

Claim 20 (Currently Amended): Method according to Claim 16 in which the liquid is a biological fluid, ~~such as blood~~ and the cations removed are copper and aluminium.

Claim 21 (Previously Presented): Method according to Claim 1 in which said chelating ion exchange resin formed from polyazacycloalkane grafted on a solid support fulfils one of the three formulas (I), (II) and (III) below:





in which n, m, p, q, r which may the same or different are equal to 2 or 3, R₁ is a solid support, R₂ represents the hydrogen atom or the (CH₂)₂-R₃ group, R₃ being a functional group chosen from the group formed by COOH, CONH₂, CH₂OH, CN or COOR₄, R₄ representing an alkyl or benzyl group, or R₂ represents the -(CH₂)-R₅ group, R₅ representing COOH or PO₃R₆, R₆ representing an alkyl group or hydrogen.

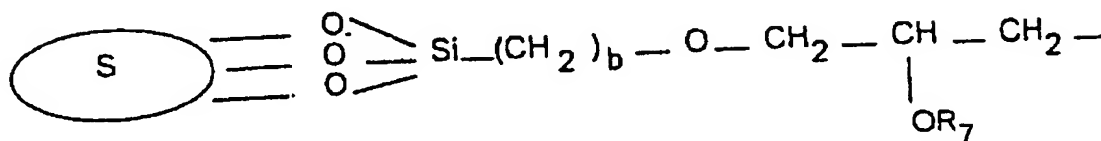
Claim 22 (Previously Presented): Method according to Claim 1 in which the solid support is an organic polymer that may or may not be crosslinked.

Claim 23 (Currently Amended): Method according to Claim 22 in which the solid support is a residue of an organic polymer that may or may not be crosslinked with alkyl halide end, ~~preferably alkyl chloride end.~~

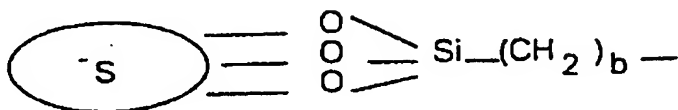
Claim 24 (Original): Method according to Claim 23 in which the solid support is a residue of chloromethyl polystyrene.

Claim 25 (Currently Amended): Method according to Claim 24 in which the grain size distribution of said chloromethyl polystyrene is between 20 and 400 mesh ~~and, preferably, between 20 and 70 mesh.~~

Claim 26 (Currently Amended): Method according to Claim 21 in which R1 is a solid support derived from silica fulfilling formula:



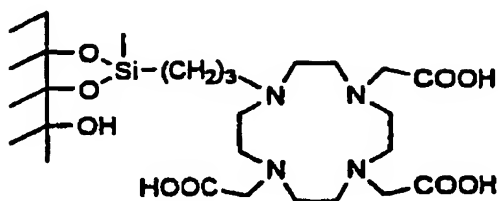
where ~~[sic; or]~~ wherein in the formula:



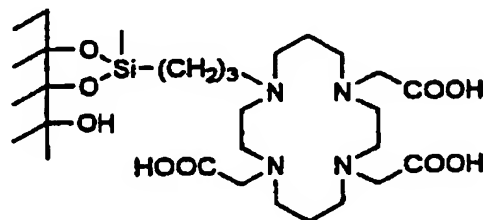
S ~~representing~~ represents a silica gel, b ~~being~~ is between 1 and 4 ~~and preferably equal to 3~~ and R7 ~~being~~ is an alkyl group or a hydrogen atom.

Claim 27 (Currently Amended): Method according to Claim 26 in which the grains size distribution of the solid support derived from silica is between 20 and 400 mesh ~~and, preferably between 20 and 70 mesh.~~

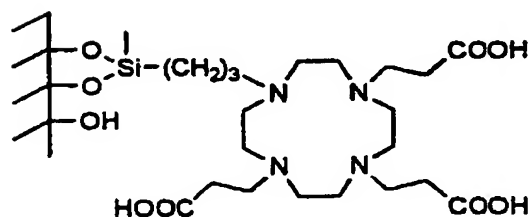
Claim 28 (Currently Amended): Method according to Claim 21 in which said resin is ~~chosen from the following resins~~ at least one selected from the group consisting of:



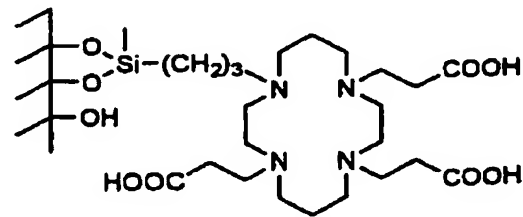
Si2222trA



Si2323trA



Si2222trPr



Si2323trPr

Claim 29 (Currently Amended): Method according to Claim 1 in which said solid support is silica, and said resin is prepared by a method in which silica is reacted with a spacer arm, then with azacycloalkane and then the substitution of the free amine functions of the polyazacycloalkane is carried out ~~by groups especially including a carboxylic function.~~

Claim 30 (Currently Amended): Method according to Claim 1 in which said solid support is silica and said resin is prepared by a method in which first, an unsubstituted polyazacycloalkane, ~~such as cyclam or cyclene~~ is reacted with a spacer arm, then said polyazacycloalkane carrying a spacer arm is grafted on the silica.

Claim 31 (Currently Amended): Method according to Claim 30 ~~in which in addition,~~
further comprising functionalizing said polyazacycloalkane carrying a spacer arm is
~~functionalized~~ prior to its grafting on the silica.

Claim 32 (Currently Amended): Method according to Claim 30 in which the amount
of polyazacycloalkane grafted per unit weight of solid support, ~~such as silica~~ is greater than
0.4 mmol.g⁻¹.

Claim 33 (Original): Installation for removal of metal cations contained in a liquid
comprising at least a column filled with a chelating ion exchange resin formed from a
polyazacycloalkane fixed on a support, means for causing a current of liquid to be treated to
pass through said column, means for conditioning said resin at a pH of 4 to 6 and means for
heating said resin to a temperature greater than or equal to 60°C.

Claim 34 (Original): Installation according to Claim 33 comprising, in addition, a
column filled with ion exchanger or organic or mineral adsorbent different from said
polyazacycloalkane resin grafted on a support, placed upstream of said column filled with
resin.

Claim 35 (Currently Amended): Installation according to Claim 33 comprising in
addition, means for regenerating said chelating ion exchange resin ~~and possibly, said ion
exchanger or organic or mineral adsorbent.~~

Claim 36 (Previously Presented): Method according to Claim 6 in which said regeneration is carried out by passing a regeneration solution through the column(s) in the reverse direction from the direction of circulation of the liquid to be treated.

Claim 37 (Currently Amended): Method according to Claim 17, wherein the liquid is a biological fluid, ~~such as blood~~ and the cations removed are copper and aluminum.

Claim 38 (New): The method according to Claim 4, wherein the conditioning of said resin is carried out by contacting said resin with an aqueous buffer solution and the major solvent is distilled water.

Claim 39 (New): The method according to Claim 8, wherein one or more of the acid solutions is a nitric acid solution.

Claim 40 (New): The method according to Claim 20, wherein the biological fluid is blood.

Claim 41 (New): The method according to Claim 23, wherein the alkyl halide end is an alkyl chloride end.

Claim 42 (New): The method according to Claim 25, wherein the grain size distribution of said chloromethylpolystyrene is between 20 and 70 mesh.

Claim 43 (New): The method according to Claim 26, wherein b is equal to 3.

Claim 44 (New): The method according to Claim 27, wherein the grain size distribution of the solid support is between 20 and 70 mesh.

Claim 45 (New): The method according to Claim 29, wherein the substitution of the free amine functions is carried out by a carboxylic function group.

Claim 46 (New): The method according to Claim 30, wherein the polyazacycloalkane is at least one of a cyclam and a cyclene.

Claim 47 (New): The method according to Claim 32, wherein the solid support is silica.

Claim 48 (New): The method according to Claim 35, wherein the means for regenerating said chelating ion exchange resin may regenerate one or more of said ion exchanger, said organic adsorbent and said mineral adsorbent.

Claim 49 (New): The method according to Claim 37, wherein the biological fluid is blood.

BASIS FOR THE AMENDMENT

Claims 1-49 are active in the present application. Claims 4, 8, 12, 20, 23, 25-32, 35 and 37 have been amended. The amendment to the claims is intended for clarity. The amendment is not intended as a disclaimer of subject matter. Claims 38-49 are new claims. Support for new Claims 38-49 is found in the original claims. No new matter is believed to have been added by this amendment.